



**DEPARTMENT OF THE NAVY**

BOARD OF INSPECTION AND SURVEY  
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INSURVINST 4730.1F  
28 Feb 08

BOARD OF INSPECTION AND SURVEY INSTRUCTION 4730.1F

From: President, Board of Inspection and Survey

Subj: MATERIAL INSPECTIONS (MI) OF SURFACE SHIPS

Ref: (a) 10 U.S.C. § 7304 Examination of Vessels, Striking of Vessels from Naval Vessel Register  
(b) OPNAVINST 4730.5(series) Trials and Material Inspections of Ships Conducted by the Board of Inspection and Survey  
(c) OPNAVINST 4770.5(series) Instructions for Inactive Ships and Craft  
(d) INSURVINST 4730.11(series) Documentation of Deficiencies  
(e) OPNAVINST 5100.19(series) NAVOSH Program  
(f) OPNAVINST 4440.19(series) Cannibalization of Equipment and Diversion of Material at Contractors' Plants to Meet Urgent Operational Requirements; Policies and Priority  
(g) INSURVINST 4730.8(series) Reports of Trials, Material Inspections and Surveys Conducted by the Board of Inspection and Survey  
(h) NAVSEAINST 9072.1(series) Shock Hardening of Surface Ships  
(i) OPNAVINST 3500.39(series) Operational Risk Management  
(j) COMDTINST M16672.2 (series) Navigation Rules (COLREGS)  
(k) 33 C.F.R. § 164 Navigation Safety Regulations  
(l) COMNAVAIRFORINST/COMNAVSURFORINST 3530.4 (Series) Surface Ship Navigation Department Organization and Regulations manual (NAVDORM)  
(m) OPNAVINST 3130.6(series) Naval Search and Rescue (SAR) Standardization Program  
(n) OPNAVINST 9094.1(series) Full Power and Economy Trial Requirements for Non-Nuclear Surface Ship Classes  
(o) INSURVINST 4730.21(series) Area Anti-Air Warfare and Self Defense Detect-To-Engage Demonstrations and Long Range Air Search Radar Performance Demonstrations  
(p) INSURVINST 4730.22(series) Standards for Surface Ship Undersea Warfare Demonstration  
(q) INSURVINST 4730.23(series) Standards for Mine Warfare Ship Mine Hunting and Sweeping Equipment Demonstrations

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- (r) DON Information Technology Standard Guidance  
Version 99-1 of 05 Apr 99
- (s) OPNAVINST 9640.1(series) Shipboard Habitability  
Program
- (t) NAVSEAINST 9593.2(series) Inspection and  
Certification Process for Oil Pollution Abatement (OPA)  
Systems in U.S. Navy Surface Ships and Craft
- (u) NAVSEAINST 4790.8 (series) Ships' Maintenance and  
Material Management (3-m) manual
- (v) INSURVINST 5221.1(series) Administrative and Logistic  
Requirements in Support of Inspections and Trials

Encl: (1) Procedures (list of appendices)

1. Purpose. To provide guidance for conducting Board of Inspection and Survey (INSURV) Material Inspections (MI) of surface ships. This instruction provides information to assist responsible authorities in preparing surface ships for presentation to the INSURV Board. Substantive changes were made in revising this instruction and it became impractical to denote changes with revision markings and change summaries. They have been purposely omitted to preclude confusion.
2. Cancellation. INSURVINST 4730.1E.
3. Discussion. Reference (a) requires a Board of Naval Officers to conduct a Material Inspection of all naval ships at least once every three years, if practicable. Reference (b) provides responsibilities and procedures for INSURV in the conduct of Trials and Material Inspections. This instruction provides procedures for surface ship Material Inspections.
4. Action. The INSURV Board inspection team, ships to be inspected, and the authorities responsible for presenting ships for an inspection to the Board of Inspection and Survey will be guided by enclosure (1).

/S/  
R. M. KLEIN

Distribution:

SNDL A1J (ASSTSECNAV RD&A)  
A1J1P (PEO SHIPS (PMS 317, 325, 377, 400C, 400D,  
400E, 400F, 500, 501))  
A3 (CNO (N4, N43, N6, N86, N87, N88))  
A2A (Chief of Naval Research)  
FKA1G (Systems Command Headquarters)  
(COMNAVSEASYSKOM (SEA 03, SEA 91))  
A151Q (PEO Carriers (PMS 312, PMS 378))  
A1J1P (PEO LMW (PMS 317, PMS 325, PMS 333,  
PMS 377))  
FH1 (BUMED)  
A6 (Commandant of the Marine Corps)  
FA24 (MIDLANT RMC)  
(SOUTHEAST RMC)  
26U (SOUTHWEST RMC)  
(SOUTHCENTRAL RMC)  
(SOUTH TEXAS RMC)  
FD3 (FLENUMMETOCEANCEN)  
FD4 (NAVLANTMETOCCEN only)  
FKP7 (SHIPYARD)  
FKP8 (SUPSHIP)  
FA24 (Base LANT)  
FB28 (Base PAC)  
20A (COMFLTFORCOM)  
21A1 (COMLANTFLT)  
21A2 (COMPACFLT)  
21A3 (COMUSNAVEUR)  
24 (TYCOMS) (Less 24J (CGFMFPAC, CGFMFLANT))  
41A (COMSC)  
C83F (COMNAVSUPSYSCOM)  
FKM31 (FOSSAC)

PROCEDURES

1. Introduction.

a. This enclosure, with appendices and supplements amplifies information and procedures in references (a) through (s), and provides specific guidance on the conduct of a surface ship Material Inspection by the Board of Inspection and Survey (INSURV).

APPENDIX A	Minimum Equipment
APPENDIX B	Engineering
APPENDIX C	Combat Systems and C5I
APPENDIX D	Habitability
APPENDIX E	Deck
APPENDIX F	Damage Control
APPENDIX G	Aviation - Air Capable Ships
APPENDIX H	Aviation - Aviation Ships (CV/CVN) and Amphibious Assault Ships (LHA/LHD)
APPENDIX I	Supply
APPENDIX J	Medical and Dental
APPENDIX K	Environmental Protection
APPENDIX L	Occupational Safety and Health
APPENDIX M	Ventilation
APPENDIX N	Corrosion/Structural

2. Background.

a. Mission. The Navy's primary mission, established by Public Law and reiterated in U. S. Navy Regulations, is to conduct prompt and sustained combat operations at sea. Material Inspections of ships assist the Navy in determining if the unit's material condition supports this mission.

(1) Material Inspections. As indicated in reference (b), the purpose of conducting periodic Material Inspections is to provide assurance of an inspected unit's fitness for further service, identify any conditions that limit their capability to carry out assigned missions, and report statistical information regarding material deficiencies. Surveys are conducted when directed by the Chief of Naval Operations (CNO) to determine and document the ship's material condition in conjunction with the deactivation process discussed in reference (c). A precept is provided by the CNO for the conduct of a Survey.

b. Deficiency Criteria and Categories. In order to evaluate a ship's readiness to carry out assigned mission requirements, INSURV uses standards contained in documents such as General Specifications for Overhaul (GSO), electronic installation and maintenance books, technical manuals, Planned Maintenance System (PMS) requirements, Reactor Plant Manuals (RPM), Steam Plant Manuals (SPM), installation control drawings, Coast Guard regulations, American Bureau of Shipping (ABS) regulations, Code of Federal Regulations, good engineering practices, TYCOM instructions, etc. The following criteria for identifying and classifying deficiencies are used:

(1) Deficiencies are items requiring corrective action to bring the material condition of the ship into compliance with required standards. These include:

(a) Failure of equipment to meet performance or safety requirements.

(b) Systems or equipment requiring excessive maintenance resources.

(c) Incomplete (or unsatisfactorily completed) installations, equipment, equipage, publications, or drawings/plans.

(d) Incomplete (or unsatisfactorily completed) required Material Inspections, certifications, or tests.

(e) Conditions which are in violation of current Navy Occupational Health and Environmental Protection standards.

(f) Deficiencies outstanding from previous INSURV Material Inspections and Final Contract Trials.

(g) Deficiencies associated with the ship's Integrated Logistics Support (ILS), where material conditions are directly attributable to ILS elements.

(h) Deficiencies associated with PMS such as:

1. Missing, incomplete, or inaccurate Maintenance Requirement Cards (MRC).

2. Inadequate support due to lack of test equipment, repair parts, training, technical manuals, tools, lubricants, or special materials required to perform PMS.

(i) Failure to follow the Integrated Class Maintenance Plan.

(2) A deficiency may exist at the outset, or it may occur as the result of a casualty during the course of an inspection. In either case it will be documented as a deficiency. If the deficiency is corrected during an inspection and if the Board has the opportunity to witness appropriate re-testing, it will be documented as a deficiency and annotated as "(corrected)".

(3) Deficiencies will be numbered as to their significance as "Part 1", "Part 2", or "Part 3", in order of importance.

(a) A Part 1 deficiency is an important deficiency which is likely to: cause the ship to be un-seaworthy; substantially reduce the ability of the ship to carry out an assigned mission (i.e. a system or equipment is inoperative or has major degradations); substantially reduce the effectiveness of personnel or essential material; and/or cause serious injury to personnel or serious damage to important material or equipment. This includes deficiencies to the ship's safety equipment and equipment safety devices.

(b) Part 2 deficiencies will document equipment material degradations that are less significant or do not meet the criteria for a Part 1 deficiency, but should be corrected to restore the ship to required specifications.

(c) Part 3 deficiencies will be generally reserved to document demonstration results, information used by INSURV for statistical analysis and documentation, and other information as specified in reference (d).

(d) A Part 1 or 2 deficiency may also be identified as a safety hazard using criteria provided in reference (e). Specifically, the following applies:

1. A Part 1 Safety is a deficiency which meets the criteria of Risk Assessment Code (RAC) 1 or 2. Within the category of Part 1 Safety, those deficiencies meeting the criteria of RAC 1 are considered to render the associated equipment "unsafe to operate".

2. A Part 2 Safety is a deficiency meeting the criteria of RAC 3 or below.

(4) Those deficiencies that are likely to cause injury to personnel or damage to equipment will be identified as safety deficiencies.

(5) All deficiencies documented during the inspection will be converted to 2-Kilo format and provided to the ship for upload/inclusion in the ship's CSMP.

c. Cannibalization.

(1) The Commanding Officer is to identify cannibalization or diversion actions to the Senior Inspector at the beginning of the Material Inspection. Any cannibalization or diversion should be in accordance with the guidelines in reference (f).

(2) In cases where cannibalization or diversion actions are reported, the conditions requiring this action will be documented in the inspection Report. This should include specific identification of the level within the chain of command at which the action was approved (e.g., Type Commander staff, Group Commander, Commanding Officer).

(3) If cannibalization or diversion actions are not reported to the Senior Inspector, but such action is identified during the course of the inspection, the situation will be documented in the message report.

d. Underway Operations. Material Inspections will contain an underway period. To safely conduct underway operations and demonstrations, a ship must certify that it has enough operational equipment to support underway operations and demonstrations. (Appendix A contains recommended minimums required to complete the underway portion of the inspection.) In the event there is not enough equipment to support underway operations, the Senior Inspector conducting the Material Inspection will allow as much time as possible to correct any problems or deficiencies which would preclude safe continuation of the required evolutions and demonstrations. If sufficient equipment for underway operations is not achieved by 0600 of Day 2, the Senior Inspector will:

(1) Direct the INSURV inspection team to complete the inspection to the best of its ability import.

(2) Identify those areas of the examination that were not completed and, as necessary, request that the cognizant TYCOM reschedule the Material Inspection.

e. Re-inspection, Re-demonstration. A re-inspection refers to an inspection that must be completely redone. A re-demonstration refers to some portion of a Material Inspection that requires completion. INSURV Board members will conduct a re-inspection. In the case of a re-demonstration, the Type Commander (TYCOM) may be requested to observe and report the results. A re-inspection or re-demonstration may be recommended if: (1) The ship's system/equipment cannot be demonstrated due to inoperative equipment, poor weather, or lack of services.

3. Responsibility. The Board of Inspection and Survey and other Navy authorities have specific responsibilities assigned with regard to Material Inspections.

a. The INSURV Board will:

(1) Establish Material Inspection dates based on nominations and proposed dates provided by authorities and commanders responsible for presenting ships (policies IAW reference (b)). Schedules will be issued including the ship's name, the type of Material Inspection, the dates, and the location.

(2) Provide the responsible authority (defined in paragraph 3.b. below), 120 days in advance of the scheduled Material Inspection, a package of information, including this instruction. This will facilitate advance planning for the conduct of the Material Inspection. This information is also available on the INSURV web site:  
<http://www.spawar.navy.mil/fleet/insurv/>

(3) Review and approve the proposed schedule of events (SOE) provided by the responsible authority for conduct of the Material Inspection.

(4) Arrange for inspectors and assistants needed to conduct the Material Inspection.

(5) Conduct the Material Inspection using the approved SOE.

(6) Document findings of deficiencies using reference (d).

(7) Present a message report, upon completion of the Material Inspection, summarizing the results. It is neither intended nor practicable to review all deficiencies identified in the course of the Material Inspection at the final out-brief. Items presented will include only those deficiencies that seriously affect a ship's capability to perform its mission and/or significantly affect the welfare of the crew. For the out-brief of inspections, attendees may include the Type, Group and Squadron Commanders, or their representatives, as well as the CO or Master.

(8) Provide the Ship, ISIC, CLASSRON and TYCOM a copy of all deficiencies that are to become a part of the Material Inspection report.

(9) Document results of the Material Inspection as required by reference (g).

b. The responsible authority is defined as the officer or commander designated to prepare and present the ship for a Material Inspection. The responsible authority is ultimately the Type Commander, but many tasks are usually delegated to the Commanding Officer and ISIC. The responsible authority will:

(1) Nominate ships and propose dates for the conduct of Material Inspections (TYCOM).

(2) Propose to the INSURV Board a schedule of events for conduct of the Material Inspection using the guidelines of this enclosure and the INSURV web site  
<http://www.spawar.navy.mil/fleet/insurv/htmlinstr/surfinst.htm>.

(3) Ensure the ship is properly prepared and ready for sea and to conduct all required demonstrations. Ships not meeting these criteria should not be presented for a Material Inspection. Ships presented for inspection with deficiencies which reduce their ability to conduct prompt, sustained combat operations at sea should ensure these deficiencies are fully documented and known to the Senior Inspector prior to the inspection team's arrival.

(4) Ensure satisfactory presentation of the ship to the Board. The authority operating the ship shall be responsible for the supervision and operation of all machinery and equipment, and for the safety of the ship, equipage, and personnel embarked. Procedures and demonstrations should be conducted as expeditiously as possible and with minimum interference between events. Unless

otherwise requested by the Board, the responsible authority should take the initiative and aggressively carry out the approved SOE, keeping the Board informed of progress. Modifications to the SOE required by casualties or other circumstances should be made by the responsible authority with the concurrence of the cognizant Board member. All compartments, storerooms, gun mounts, handling rooms, magazines, and cabinets should either be unlocked or have a person standing by with necessary keys. The ship shall be clean and properly stowed for sea, excepting equipment laid out for inspection. Insofar as practicable, the bilges should be dry. The full power demonstrations should be scheduled as early in the underway period as possible (after the boiler flexibility tests, if applicable).

(5) Arrange for services required for hull and combat system demonstrations and provide for coordination of these services.

(6) Provide the Board administrative support, and ensure the availability of all documents, lists, records and other data IAW reference (u).

(7) Ensure a sufficient number of ship representatives are available to accompany each Board member and their technical assistants during the Material Inspection.

(8) Ensure ship work during the Material Inspection is held to a minimum to preclude interference or conflict with the conduct of specific evolutions.

(9) Ensure that masking of passageways for cleaning, waxing, or painting is suspended during the Material Inspection.

(10) The Commanding Officer will provide a signed letter stating all pre-underway checks have been accomplished. In the event a check could not be completed satisfactorily he shall state the problem along with the impact to the inspection. In any event all discrepancies discovered during pre-underway testing will be reported along with what corrective action was taken.

(11) The Commanding Officer shall write a Letter of Concerns to the President, Board of Inspection and Survey, outlining repair material and logistics problems which he feels are significant and would contribute to the ship's inability to support prompt, sustained combat operations at sea. This letter should include a recommended list of open and inspect items. It

should not be a list of current deficiencies which will affect the outcome of the inspection.

4. Liaison with the Board. In order to ensure preparations and actual conduct of the Material Inspection are orderly and efficient, early liaison with INSURV is strongly recommended. An INSURV Recorder is assigned for each Material Inspection as the Board's liaison for the responsible authority. Questions regarding any aspect of the Material Inspection may be addressed to the Recorder to ensure early resolution of issues or difficulties. The ship should assign an officer as INSURV Coordinator to work directly with the Board's Recorder.

5. Linked Inspections. By request from the TYCOM and approved by INSURV, an INSURV Material Inspection (MI) may be designated in advance as "linked" with other existing technical inspections (e.g. C5RA, CAPS, etc.) if proposed by the applicable TYCOM to INSURV in accordance with reference (b) and the following additional guidelines:

a. Procedures used to inspect equipment during the linked inspection must be the same as used during the INSURV MI to ensure a direct connection can be established. The INSURV web site provides a listing of all equipment/systems inspected and procedures used for each.

b. The results of the requested linked inspection must be provided to INSURV no later than 14 days prior to the start of the Material Inspection.

c. Underway demonstrations are not linkable events.

d. Equipment used for an MI underway demonstration that was not fully operational at the end of a linked C5RA event and subsequently reported as "corrected" by the ship prior to the start of the MI will require all Material Inspection procedures to be re-accomplished.

e. All equipment inspected during the requested linked C5RA inspection will have to have the following information provided:

(1) System, sub-system, and equipment inspected.

(2) Technical publication standard (PMS, TM, etc.) and procedure used IAW INSURV inspection procedure list.

(3) Listing of all deficiencies found. Corrected deficiencies will be annotated as "corrected".

(4) Status of equipment at end of inspection will be identified as operational, degraded, or inoperative.

(5) Point of Contact information of inspector or inspection organization.

(6) All pre-inspection information is required to be imported into PRISMS when provided to INSURV prior to inspection.

If a requested linked inspection is approved, the basis of the INSURV final report will be material condition of the ship "as found" on day 1 of the C5RA linked inspection.

INSPECTION SCHEDULE

1. General.

a. A Material Inspection is normally conducted in phases. These phases are:

- (1) Underway
- (2) Post-Underway
- (3) Out-brief

b. Normally a Material Inspection should be limited to five days. The Board's arrival time and/or the size or type of ship being inspected may necessitate varying this period slightly.

2. Inspection Schedule.

a. General

(1) A proposed schedule of events (SOE) for conduct of the Material Inspection should be provided to the INSURV Board for review and approval at least 30 days in advance. Liaison with the INSURV Recorder should be conducted prior to submission of this proposed schedule. Sufficient copies of the approved schedule should be prepared and furnished to all INSURV members and interested parties upon their arrival.

(2) The SOE shall include demonstrations of all onboard propulsion, hull, electrical, auxiliary, and C5I equipment. Mutually compatible demonstrations may be scheduled simultaneously.

(3) It should be understood that the SOE represents only a fundamental set of demonstrations. Additional tests and demonstrations may be requested by INSURV to pinpoint deficiencies when unsatisfactory or marginal performance is observed. In addition to performance demonstrations, all equipment will be examined to determine if it is installed in a manner permitting its operation for its intended purpose, can be reasonably accessed for required preventative and corrective maintenance, and provides adequate safety protection to the operator.

b. Pre-underway Phase. INSURV will commence Material Inspections with a short preliminary conference for the purpose of

meeting counterparts and checking documents provided at arrival. Upon completion of this conference, the ship is free to get underway at the Commanding Officer's discretion.

c. Underway Phase. This phase will consist of operational demonstrations of ship's equipment and systems.

(1) When possible, the at-sea portion of the inspection should be completed by the afternoon of day 2.

(2) Details of demonstrations and checks to be conducted during the at-sea portion of the Material Inspection are contained in the departmental appendices.

d. Post-Underway Phase. Detailed inspections and tests of all systems and equipment will start no later than 0800 on Wednesday morning (or earlier as allowed by SOE) for Material Inspections. The majority of civilian and uniform Technical Experts will arrive and commence material checks in accordance with respective departmental appendices below. Additional information can be found on the INSURV Web Site [www.spawar.navy.mil/fleet/insurv/](http://www.spawar.navy.mil/fleet/insurv/). INSURV members may also designate equipment to be opened or disassembled for the post-underway examination. Equipment will be chosen based upon observations during the underway portion and material checks conducted during the Material Inspection, recommendations of the responsible authority, equipment that has been targeted as suspect due to machinery condition analysis or other tests, as well as PMS required scheduled openings. Equipment operating within established technical parameters will not normally be opened with the exception of filters, strainers, and sump inspection covers. It is not the intent of the INSURV inspection to disable a ship, but rather to accurately ascertain equipment conditions. All bilges, particularly in the area of main propulsion machinery and boiler foundations, should be clean and dry to facilitate a thorough inspection of foundations and vital structural members. Should a situation arise whereby it is impossible for INSURV to conduct this phase of the examination, local agencies will be designated to complete the inspection and report findings to INSURV.

APPENDIX A

MINIMUM EQUIPMENT

1. Minimum Equipment Definition. The President, Board of Inspection and Survey, is designated as the CNO's agent for development of policy and procedures for Trials, Material Inspections and Surveys of ships (reference (b)). A fundamental element of INSURV's overall assessment of ship-wide material condition is demonstration of the ship's material readiness to safely take the ship to sea for sustained operations. Proper at-sea operations must be focused on maintaining navigation, propulsion, electrical power, and associated auxiliaries, including hotel services, while ensuring the safety of operating personnel. Sufficient equipment to conduct meaningful underway demonstrations must be achieved and maintained throughout the underway phase of the inspection. Based on a detailed review of all applicable laws, regulations and directives, and a thorough consideration of Operational Risk Management (ORM) (reference (i)) for a peacetime, non-emergent inspection, the below minimum equipment criteria applies in determining readiness for underway operations during an INSURV Material Inspection. Nothing in this instruction precludes a ship from operating degraded or inoperative equipment for emergency use.

2. Minimum Equipment Criteria. For inspection purposes, "in commission" means equipment or systems are fully operational, in normal alignment, with all safety, control, and primary monitoring devices set within prescribed calibration/test periodicity. In cases where "half" of installed equipment is required to be operational, "half" is determined by rounding up when an odd number of components exists.

3. Inoperative Equipment. Per reference (a), equipment with a safety deficiency corresponding to a Risk Assessment Code (RAC) of 1 or 2 will not be operated. Equipment with a deficiency rendering it inoperative or "Repair Before Operate" (RBO) as specified in PMS, Operational Sequencing System, Joint Fleet Maintenance Manual, TYCOM Guidance, or Systems Command Technical Guidance will not be operated. Equipment that cannot be operated per operating instructions will not be operated without appropriate measures in place to ensure safe operation (e.g. departure from specification, approved deviation from operating instructions, additional watchstander, etc.).

5. Minimum Equipment.

a. Engineering. The following equipment must be in commission:

(1) In steam ships, one boiler in each fireroom/combined machinery space. Specifically the following numbers of boilers are required:

<u>Installed</u>	<u>In Commission</u>
2	2
3	2
4	2
8	4

(2) In diesel ships, the following criteria apply: All main propulsion diesel engines must be in commission in single shaft ships. Multi-shaft ships must have at least one in commission main propulsion diesel engine on each shaft. Minimum propulsion equipment for Patrol Coastal ships will be met if the ship has one propulsion shaft in commission per main engine room.

<u>Number of Engines Installed</u>	<u>In Commission</u>
1	1
2	2
4	2

(3) In gas turbine ships the following applies:

(a) CG 47/DDG 51/LHD 8Class - At least one engine per shaft.

(b) FFG 7 Class - Both engines.

(4) Non-steam propulsion ships, one safe-to-steam auxiliary boiler (if so equipped).

(5) All main propulsion steam turbines must be in commission in single shaft ships. Multi-shaft ships must have one half of all main propulsion steam turbines in commission.

(6) Installed automatic boiler controls for required in-commission boilers.

(7) Two different pumps (main feed pump(s) with associated feed booster pump(s) or emergency feed pump(s)) capable of feeding the boilers in each plant.

(8) Half of each type of air compressor (LP, MP, and HP) when the system supplies air to support main propulsion, auxiliary machinery or navigational radar. (Reduced HP air is not a qualifying source to supplement less than minimum equipment for MP/LPACS.)

(9) Main lube oil systems must be capable of complete sequential automatic operation.

(10) Half of the auxiliary components in each plant.

(11) Half of the installed fire pumps and their associated sea suction/discharge valves and remote operators.

(12) Half of the seawater service pumps and their associated sea suction/discharge valves and remote operators.

(13) Half of the distilling units. The ship must be capable of providing distributed potable water service.

(14) Sufficient air conditioning units, associated chill water pumps and seawater pumps, to fully support all engineering and combat systems functions.

(15) Half of the installed ship's service generators and associated waste heat boilers.

(16) Half of the ship's emergency generators.

(17) The following numbers of 400 HZ motor generator sets or static frequency converters are required:

<u>Installed</u>	<u>In Commission</u>
2	2
3	2
4	2

Note: If one 400 HZ MG/Converter can fully support the ship's combat systems as confirmed by ship's technical documentation, the underway portion of the inspection may be conducted at the discretion of the ship's Commanding Officer and the INSURV Senior Inspector.

(18) All steering machinery and control units. Each steering ram shall have at least two in commission sources of hydraulic power, excluding emergency hand pumps and emergency HPU's.

b. Navigation. Navigation/vital ship control equipment must be fully operable as follows (references (j) through (l)):

(1) Rudder Order/Angle Indicators. Must be fully operational in the pilot house (centerline and ship's control console (SCC)/helm) and in after steering.

(2) Engine RPM/Pitch Indicators. Must be fully operational in the pilot house (readable from the centerline conning position).

(3) Integrated Throttle/Engine Order Telegraph. Sat operational test, all indicator lights must illuminate.

(4) Gyrocompass. Must be fully operational.

(5) Gyrocompass Repeaters. Must be fully operational at the helm, after steering and centerline.

(6) Surface Search Radar. At least one program of record, surface search radar capable of radar navigation must be fully operational.

(7) Magnetic Compass. Must have an operational magnetic compass (binnacle or digital flux gate) observable from the helm. For a binnacle magnetic compass, a current variation/deviation table should be available for use.

(8) Ship's Whistle. Must be operational when tested from the pilot house. Manual, electronic, and timer modes are tested (if applicable).

(9) Fathometer. Must be operational, including the chart recorder.

(10) Ship's Bell and Gong (if required). Must be in place and operational.

(11) Navigation Lights. Primary navigation lights (Port/Starboard running lights, forward and aft (if required) masthead lights, stern light) must be operational, including secondary filaments. Associated navigation light telltale panel must pass applicable PMS. Applicable day-shapes for vessel not-

under-command, restricted maneuvering, and anchoring must be available on-board.

(12) Bridge-to-Bridge VHF. Must be operational (tested with assist unit).

(13) Satellite Navigation/Global Positioning System (GPS) must be operational.

c. Damage Control. Damage control/safety equipment must be fully operable as follows:

(1) All main engineering firefighting systems and equipment (Halon, AFFF, Fixed CO<sub>2</sub>, Portable CO<sub>2</sub>, Portable PKP, EEED's, installed emergency lighting, etc.) installed in engineering spaces required for underway operations must be within current PMS periodicity. The amount of spare AFFF concentrate shall, at a minimum, be adequate to compensate for the underway demonstrations.

(2) Engineering Emergency Escape Trunks (balanced joiner doors (Ellison doors)) emergency lighting, and escape hatches/scuttles) shall be fully functional.

(3) Life Support Equipment (OBA's, SCBA's, and EEED's) will be fully functional.

(4) Half of the installed SCBA compressors must be fully operational.

(5) Half of the ship's P-100's must be fully operational.

(6) The ship must be capable of de-watering all main spaces remotely through installed space capability, or via other spaces through main drainage system cross-connects or bulkhead stops.

(7) Designated main space repair locker/s must be sufficiently equipped to properly respond to an emergency.

d. Deck. The following deck equipment must be fully operational;

(1) The ship must be capable of safely raising and lowering at least one anchor. Half of the anchor windlass machinery must be operational.

(2) One ready lifeboat and its associated davit (preferred). Ships that opt to get underway without an operational boat (if authorized in accordance with TYCOM and/or numbered fleet commander regulations) shall ensure that all shipboard SAR equipment, including rescue swimmer equipment and qualified rescue swimmers, are onboard, have been inspected by the appropriate INSURV inspector, and are ready for use. The ship should review ship-alongside recovery challenges and ORM with the Senior Inspector prior to underway operations.

APPENDIX B

ENGINEERING

1. General Requirements.

a. Preparation.

(1) The INSURV Engineering Directorate is organized into three inspection areas: Auxiliaries (AX), Electrical (EL), and Main Propulsion (MP). For nuclear-powered ships, the Reactor (RX) inspection area will be included. Checklists of the systems and machinery inspected in each of these areas are available for download from the INSURV web site (<http://www.spawar.navy.mil/fleet/insurv>). These INSURV Engineering checklists are ship class specific and delineate equipment inspected by the Engineering inspectors during the inspection. INSURV engineers shall be informed of differences between the equipment reflected in the ship class checklist and that installed in the ship. INSURV engineers will provide specific testing requirements for equipment not reflected on the ship class checklist.

(2) In support of the overall inspection, the INSURV Engineering checklists encompass more than what the ship typically performs during a routine plant light off. It is imperative that Engineering Department leaders review these checklists well in advance of the inspection/survey in order to formulate a plan. It is the responsibility of the ship to prepare and coordinate the sequencing of all checks and demonstrations.

(3) Qualified ship's force personnel will operate all equipment for checks and demonstrations. INSURV engineers shall be informed in advance if Sailors other than those attached to the ship being inspected will operate equipment.

(4) The Engineering Officer shall ensure all correspondence, documentation, records, and logs listed in reference (v) are available for review.

(5) Recommended Plant Alignment.

The ship should be ready to get underway upon arrival of the Board.

b. Pre-Underway Phase.

(1) Inspectors will review documentation listed in reference (v) to ensure the ship has no documented deficiencies that would preclude safe underway operations.

c. Underway Phase.

(1) During the underway phase, the ship's propulsion and control equipment will be tested to technical specifications to determine the adequacy of ship's systems to support required mission areas. The Engineering demonstrations will include: anchor windlass (see Appendix E for additional details); boiler flexibility tests on all propulsion boilers (prerequisite is Level III or better for full power demonstration and Level II for quick reversal demonstrations); full power ahead; steering test ahead; quick reversal to full power astern; steering test astern; and quick reversal to full power ahead. Additional information and requirements for underway Engineering demonstrations is contained in paragraph 2 of this appendix.

(2) Engineering inspectors will require additional underway testing/demonstrations such as soot blower operation, fuel oil transfer system operability, water testing, distilling unit capacity, Prairie/Masker operation, operation of amphibious mission equipment, degaussing system operations on the degaussing range, etc. The underway portions of the INSURV Engineering checklists delineate required demonstrations and specific requirements and references.

Note: Ships achieving satisfactory degaussing range results in both directions within 60 days of the inspection will not normally be required to re-demonstrate the system during the underway phase.

d. Post-Underway Phase.

(1) The ship shall provide a recommended post-underway inspection list of machinery. Prior to returning to port, INSURV Engineering Inspectors will provide the Engineer Officer/Reactor Officer a specific list of machinery to be disassembled and inspected. This list will take into consideration the ship's recommendations, machinery condition analysis information, upcoming maintenance requirements, the Board's observations of operating conditions of the machinery, and recent outside-agency inspections where the reports were provided to the Senior

Inspector prior to the inspection and the results accepted by the Senior Inspector as part of the inspection.

(2) Preparation is critical for the efficient conduct of the post-underway phase. This preparation should include:

(a) Review of manufacturers' technical manuals and maintenance requirement cards.

(b) Assembling the correct equipment for each post-underway inspection item including special tools, chain falls, hydraulic jacks, etc.

(c) Staging sufficient measuring tools for fulfilling data-taking requirements of the procedure, taking into consideration that all work centers may be working simultaneously.

(3) By agreement between ship's force and the Board, some equipment may be secured and opened for inspection prior to return to port, or where feasible, during day 2 of the inspection. Where equipment cool-down requirements dictate (e.g., boilers, main engines), post-underway inspection of these items may not be conducted until the day after the ship's return to port. The goal of the ship's management of the post-underway phase should be to provide a continuous flow of equipment ready for inspection.

(4) Internal components should be drained, laid out - BUT NOT CLEANED - and ready for observation by the cognizant inspector. The applicable technical manual and maintenance procedure shall be on station for reference. Required measurement data will be presented to the inspector along with tolerances. Boiler firesides and watersides will normally not be inspected.

(5) Safety devices and monitoring systems will be demonstrated for inspectors during the post-underway phase. All checks will be conducted using the applicable PMS, EOSS/RPM/SPM, or other authorized (technical manual-based) procedural instructions indicated on the INSURV checklists. Sufficient test equipment (e.g. tachometers, flow meters, comparators, signal generators, multi-meters, voltage testers, megohmmeters), in calibration and safety-checked, should be available to support the simultaneous conduct of demonstrations of multiple components. Specific system and equipment checks are delineated in the checklists for each Engineering inspection area (AX, EL, MP).

2. Full Power, Quick Reversal, and Steering Demonstration Requirements.

a. General.

(1) An Engineering demonstration memorandum (example available for download from the INSURV web site) shall be prepared by the ship and provided to the inspection team's Senior Engineer.

(2) INSURV inspectors will not act as official observers for any demonstrations for competitive purposes.

(3) Inoperative equipment shall not be used during underway demonstrations.

(4) Deficiencies in propulsion equipment, operation of equipment outside limiting plant parameters, failure to meet technical criteria established by applicable technical documentation, and/or equipment casualties during demonstrations will result in point deductions. Demonstration grading sheets are posted and available for download on the INSURV web site.

b. Specific Requirements.

(1) Full or High Power.

(a) Prerequisites and requirements for the full power demonstration are found in documentation including this instruction, reference (n), PMS, and Engineering Operational Procedures (EOP). All propulsion train equipment shall be operational (in commission) to proceed to the full power demonstration.

NOTE: A Level III or better boiler flexibility test on all propulsion boilers is a prerequisite for the full power demonstration.

(b) For ships that are unable to achieve required equipment to commence the full power demonstration, the propulsion plant will be aligned in the most effective EOSS approved configuration and a one hour high power demonstration (full power score: 0.00) will be attempted at the best possible speed in that configuration. The Board will inspect the plant during the high power demonstration.

(c) The Engineering Officer will inform the INSURV Senior Engineer when he is ready to begin the full power or high

power demonstration. The Senior Engineer will notify the Engineering Officer when the event has formally commenced.

(d) The full power demonstration will be conducted for a period of one hour for all Material Inspections and Surveys. Ship's force shall collect data at least every 15 minutes during the demonstration period. A copy of the demonstration data sheets shall be provided to the Senior Engineer for evaluation as soon as possible upon completion of propulsion demonstrations.

(e) For ships that commence the full power demonstration but have to terminate because of a major plant casualty, full power will be graded as unsatisfactory.

(f) The Senior Engineer will inform the Engineering Officer when the full or high power demonstration is complete and ahead steering checks may commence.

(2) Ahead Steering.

(a) Ahead rudder swing tests shall be accomplished with the propulsion plant developing full power and the ship at maximum ahead speed. Stop watch times are to be measured in the steering gear compartment beginning at the time the rudder begins to move from 35 degrees and ending when the rudder position passes 30 degrees (with some exceptions as noted by PMS) on the opposite side from where timing started. At the completion of ahead rudder swing checks, blocking valve checks will occur by securing power to the on-line unit to verify the rudder holds 25 degrees left and right without drift in accordance with NSTM 562 requirements. Tests will be conducted in each normal (EOSS approved) alignment of HPUs associated with the rudder(s) (e.g. "A" HPU(s) then "B" HPU(s)).

(b) Steering tests will be graded when the propulsion plant achieves at least 80% of full power. When 80% of full power cannot be achieved but steering demonstration prerequisites are otherwise met, steering demonstrations will be conducted at the maximum speed available, observed by the Board, and graded as "No Score Assigned".

(c) If external conditions such as wind and sea state prevent conducting steering demonstrations, they will be graded as "Not Demonstrated".

(d) If a steering casualty prevents commencement or causes termination of steering demonstrations, or a significant or major discrepancy is noted, steering will be graded as unsatisfactory or degraded.

(e) The Senior Engineer will inform the Engineering Officer when the ahead steering checks are complete and the quick reversal astern may commence.

(3) Quick Reversal Astern.

(a) After completion of full power ahead steering tests, the quick reversal astern will be executed, bringing the shaft speed to rated astern full power RPM/Pitch. On steam ships, the ahead and astern throttles will be opened and closed in a quick manner (the maximum rate allowed by applicable technical and operating documentation) while maintaining boiler drum pressure below max or above min limiting parameters. A Level II or better boiler flexibility test on all propulsion boilers is a prerequisite for the quick reversal demonstrations.

(b) The quick reversal astern will be graded when the evolution can be conducted from at least 80% of full power ahead to at least 80% full power astern. For ships that can not achieve the required 80% power to conduct a traditional quick reversal astern, the reversal will be conducted at the maximum speed possible in both the ahead and astern directions, will be observed by the Board, and a score of 0.00 will be assigned.

(c) For ships that commence the quick reversal astern, but have to terminate because of a major plant casualty, the quick reversal will be graded as unsatisfactory.

(d) The Senior Engineer will advise the Engineering Officer prior to commencement of full power astern steering tests.

(4) Astern Steering.

(a) Rated continuous astern full power RPM/Pitch shall be established prior to commencement of the full power astern steering test. Astern rudder swing tests shall be accomplished in the same manner as ahead rudder swing tests with the propulsion plant at full power and the ship at maximum allowed astern speed. At the completion of astern rudder swing checks, blocking valve checks will occur by securing power to the on-line unit to verify the rudder holds 25 degrees left and

right without drift in excess of NSTM 562 limits. Tests will be conducted in each normal (EOSS approved) alignment of HPUs associated with the rudder(s) (e.g. "A" HPU(s) then "B" HPU(s)).

(b) Grading criteria for astern steering are the same as criteria for ahead steering. A single steering score is assigned.

(c) The Senior Engineer will inform the Engineering Officer when the astern steering checks are complete and the quick reversal ahead may commence.

(5) Quick Reversal Ahead.

(a) Upon completion of astern steering tests, a quick reversal ahead will be executed, bringing the shaft(s) to the previously computed full power RPM/SHP in the same rapid manner as the quick reversal astern.

(b) Grading criteria for the quick reversal ahead are the same as criteria for the quick reversal astern. Each quick reversal is scored independently and assigned its own grade.

(c) The Senior Inspector will inform the ship when all propulsion demonstrations are complete.

APPENDIX C

C5I

1. C5I Definition. The INSURV C5 Directorate is organized into seven inspection areas: Anti-Submarine Warfare (AS), Communications (CC), Command, Control and Information Systems (IS), Mine Warfare (MN), Navigation (NV), Operations (OP), and Weapons (WP). Included within each inspection area are the equipment and spaces required for the maintenance and support of these systems, e.g. air, water and power. Checklists and pre-inspection materials are available for download from the INSURV web site (<http://www.spawar.navy.mil/fleet/insurv>).

(a) Anti-Submarine Warfare systems include hull-mounted and towed array sonars, underwater fire control systems, torpedo launching systems and torpedo handling equipment, sonar dome and sonar dome pressurization systems, fathometer, etc.

(b) Communications systems include installed and portable communications systems (HF, VHF, UHF, EHF and SHF) and associated antenna systems, NAVMACS, terminal and application equipment, switching and distribution equipment (including cryptographic equipment), and EMI and IMI checks.

(c) Command, Control, and Information systems include classified and unclassified networks and command and control applications, SCI networks, communications and applications, and meteorology systems, if installed.

(d) Mine warfare systems include associated sonars, precise navigation systems, the mine neutralization system and vehicle, multipurpose and deck cranes, minesweeping gear and winches and the on-board trainer.

(e) Navigation systems include the equipage associated with navigation, navigation lights, gyrocompasses, magnetic compasses, integrated bridge systems, and signal bridge equipment.

(f) Operations systems include surface and air search radars, electronic warfare and decoy launching systems, air traffic control systems, combat direction systems, display systems and tactical trainers.

(g) Weapons systems include installed gun and gun weapon control systems, missile launchers, fire control systems, armories, magazines and sprinklers, ready service lockers, crew-served weapons, ammunition hoists and elevators, weapons handling systems and equipment, and AT/FP equipment inventory.

2. General Inspection Criteria. The Board uses standards set forth in governing technical documentation (PMS, General Specifications for Overhaul (GSO), technical manuals, related OPNAV and NAVSEA publications and instructions, etc.) to evaluate the readiness of a ship for acceptance or evaluate a ship's readiness to carry out assigned mission requirements. The Board will:

a. Determine the capability of the integrated combat systems to successfully detect, track, and engage targets while maintaining effective internal/external command and control. Inter-operability of all associated subsystems will be checked.

b. Determine the condition of C5I spaces with regard to human engineering, man-machine interfaces, maintenance and operational requirements, stowage, ventilation, air conditioning, lighting, and safety.

c. Check installation workmanship including cabling, mounting, bracing, and grounding.

d. Check for items that may present a clear and immediate safety hazard to personnel or equipment.

e. Check the overall material condition of equipment and spaces, using standards set forth in the GSO, electronic installation and maintenance books, specific equipment installation standards (technical manuals, installation control drawings, etc.), NAVSEA/SPAWAR technical manuals, electronic information bulletins and PMS standards.

f. Check adequacy of test equipment allowance to support maintenance of installed systems. Ensure the test equipment on board is operational and calibrated, and proper stowage facilities are provided. Test equipment used during Material Inspections should normally include the ship's allowance equipment.

g. Evaluate reliability and maintainability problems based on the documented history of applicable equipment's performance.

h. Check the overall operational and material condition of electronic cooling water and electronic dry air systems to include

minimum safe conductivity requirements and proper operation of all associated monitoring devices (e.g. flow, pressure, temperature, conductivity, and visual/audible local and remote alarms).

### 3. Pre-Arrival Requirements.

a. Prepare a detailed plan and schedule a briefing for all combat systems personnel with particular emphasis on those demonstrations requiring outside assistance (e.g. search, height-finding, fire control and ACLS radars, IFF (interrogator and transponder), ECM, ESM, TACAN, NTDS, and external communications). Scheduling aircraft services is the ship's responsibility and will, if possible, include back-up services to minimize effects of bad weather and/or equipment failure. CRUDES ships are responsible for OPAREA clearances and NCEA augments (if required) to support the main battery gun live firing demonstration. The demonstration plan will be integrated with the Material Inspection SOE for the ship. Emphasis should be placed on scheduling critical demonstrations which may only be accomplished at sea. Individual PMS checks do not need to be specifically scheduled unless they require coordination with, or impact, other activities. Demonstrations should be grouped together as much as possible for each service (i.e. one airplane on one run can do the long-range detection demonstration, IFF interrogator checks, TACAN checks, etc.).

b. Establish an organization to operate the combat systems and coordinate all demonstrations, including aircraft control, establishing necessary communications, and documenting event results and data collection. INSURV personnel will not operate any equipment, and may not act as a second person when "two-man rules" are dictated. A counterpart listing should be made of INSURV inspectors, ship's force, contractors, and SUPSHIP personnel as appropriate.

c. Qualified ship's force personnel will typically operate all equipment for checks and demonstrations. INSURV inspectors shall be informed in advance if sailors other than those attached to the ship being inspected will operate equipment.

d. Make arrangements with an assist ship, station, and/or aircraft for the demonstration of equipment requiring outside assistance (e.g. LINKs, Global Command and Control System-Maritime (GCCS-M), HF/UHF Long Haul, etc.).

e. Prepare a communications plan to execute during the Material Inspection. To minimize confusion concerning the status of outside services, a coordination circuit with the providing

agency and Fleet Area Control and Surveillance Facility should be established.

f. For those ships with an air search radar, obtain a prediction (IREPS/AREPS) of atmospheric conditions affecting radar propagation for the time and area of the underway demonstration. Reports shall be requested by the ship (send request to [FNMOC.CDO@navy.mil](mailto:FNMOC.CDO@navy.mil)) and must include all lobes of radar coverage.

g. Have information and documentation available for use by the INSURV C5I inspectors IAW reference (v).

#### 4. Pre-Underway Phase.

a. After the INSURV arrival conference, the ship will brief its plans for conducting each detect to engage (DTE) demonstration and main battery gun live fire demonstration (CRUDES only). Attendees will include INSURV inspectors and cognizant ship's force personnel, technicians, and contractors. Each event will be reviewed with emphasis on procedures, environmental, doctrine statements, and watch team organization. Aircraft schedules and flight plans will be discussed and the senior C5 inspector will provide feedback on the general conduct of the inspection.

b. Combat Systems computer suite endurance run. Prior to the ship getting underway, all computer systems (SSDS/CDS/ACDS/AWS) will be reloaded and brought on-line with all interfaces activated (e.g. gunfire, ASW, etc.). The system should remain operational without restart or reboot until completion of the underway portion of the inspection. If the system faults at any time during this endurance run or requires restart or reboot (warm or cold), INSURV must be notified and the cognizant ship's maintenance personnel will document the problem (e.g. type of fault, symptoms, any printout of memory, etc.). For AEGIS-equipped ships, the endurance run shall commence upon loading of "at-sea" packs prior to underway.

#### 5. Underway Phase.

a. This phase will consist of integrated systems testing and operational demonstrations which verify the ship's capability to perform its primary and secondary missions, identified in references (o), (p) and (q), as applicable. Emphasis should be on ensuring the ship's primary mission areas are fully demonstrated.

b. Execution of the schedule remains the responsibility of the ship. Schedules will not be changed without prior coordination with the INSURV senior C5I inspector.

c. Safety checks of combat systems equipment will be accomplished during both the underway and inport phases. Safety checks will be limited to those most likely to cause serious injury to personnel or damage to equipment.

d. A check is made of combat systems equipment/spaces to ensure they are secured for sea and properly stowed.

e. Integrated Bridge Systems (IBS), Voyage Management Systems (VMS), steering by autopilot, and secondary conning station will be demonstrated (if equipped).

f. Integrated systems tests (DSOTS, OCSOT, ASW SCOT, etc.) should be conducted during the pre-underway phase to ensure systems are ready for underway demonstrations.

g. Portions of OCSOT may be specified for demonstration following the AAW/Self Defense DTE demonstrations in order to verify operation of equipment/interfaces. Specific guidance for each mission area demonstration to be conducted is as follows:

h. Anti-Air Warfare.

(1) Outside Assistance. Aircraft support for this phase will vary according to the operational capabilities of the ship. Schedules and profiles should be planned to combine as many demonstrations as possible to minimize both the time and the services required.

(2) Aircraft for the long range air tracking should have the following minimum capabilities: as close as possible to a one square meter cross section at the frequency of the radar, altitude capability to 30,000 (30K) feet, UHF radio (secure voice not required), TACAN, IFF system with at least mode 3 and mode 3C, radar system, and sufficient on station time for one run at 30K feet to 225 NM and back, as well as one run for each close-in self defense system, consisting of a low elevation inbound run from 40 NM. An aircraft with extended on station time should be requested. Additionally, the ship should request the aircraft be outfitted with a pod for ES evaluation during the DTE.

(3) Functions Verified.

(a) Demonstrate maximum detection ranges of each radar system using controlled air services with aircraft profiles at various altitudes to fully demonstrate the system (reference (n)).

(b) Verify applicable range, bearing, and elevation alignment accuracy between each surveillance radar system and fire control system using available relative alignment test program/procedures.

(c) Verify performance of all IFF systems, both the interrogator and transponder, to all modes and at maximum range. Use of SESEF services is encouraged.

(d) Verify all operational modes of each radar system (e.g., ADT, MTI, etc.). Jamming services will not be required unless specifically requested by INSURV in advance.

(e) Verify maximum acquisition and track ranges of fire control radar systems at high, medium, and low altitudes.

(f) Demonstrate a successful surface-to-air engagement using missile weapons systems (non-firing demonstration). This should include integrated functions such as automatic detection and track, orders for engagement, weapons directions system (WDS/WCS) assignment of FCS and launcher, target scheduling, launcher loading, recommended fire and completion of the firing sequence (where applicable). The objective is to demonstrate the complete detect-track-engage sequence including proper function of CDS, WDS and AWS programs (reference (o)).

(g) Demonstrate a successful surface-to-air engagement using all close-in self-defense systems. See reference (o).

(h) Verify Link 4/4A connectivity (shore-based services may be used if air services are not available).

(i) Establish a Link 11 net. Link should be demonstrated on both UHF and HF frequencies.

(j) Verify Link 16 connectivity with another Link 16 capable unit.

(k) Demonstrate TACAN operation 12 NM or greater from land. Note ranges for DME/bearing as reported by the aircraft on outbound and inbound legs.

(l) Demonstrate individual CDS/SSDS/ACDS/ADS displays in their primary functional mode of operation.

(m) Conduct UHF plain voice checks with aircraft in conjunction with long range radar tracking.

(n) Detailed guidance is contained in reference (o).

i. Undersea Warfare.

(1) Outside Assistance. None required for ships capable of monitoring sonobouys directly. A ship-launched target (EMATT) will be tracked using both active and passive sensors.

(2) Functions Verified.

(a) Demonstrate Prairie-Masker system operation.

(b) Demonstrate correlation of range and bearing between multiple sensors, when applicable.

(c) Demonstrate accuracy of range and bearing transmissions to displays and fire control sub-system, and accuracy of fire control data transmissions to launching systems, as demonstrated by most recent ASW SCOT results.

(d) Demonstrate launch/retrieval capability of TACTASS (if installed).

(e) Demonstrate fathometer range accuracy on all scales, and proper operation of the chart recorder.

(f) Demonstrate expendable bathythermograph (XBT) and proper operation of the recorder.

(g) Demonstrate operation of the "object avoidance" function of sonar.

(h) Detailed guidance is contained in reference (p).

j. Communications.

(1) Outside Assistance.

(a) Shipboard Electronic System Evaluation Facility (SESEF) for HF transmitter/receiver mode checks and for cryptographic system checks will be used.

(b) An assist ship for those systems or functions unable to be demonstrated via SESEF (e.g. S-TADIL-A, S-TADIL-J, etc.).

(2) Functions Verified.

(a) Demonstrate emergency/portable communications equipment. Ensure emergency transmissions are not transmitted outside the ship, which would violate international law.

(b) Demonstrate all terminal equipment. A distortion analyzer test set should be on board to conduct PMS checks.

(c) Demonstrate each HF transmitter/receiver with SESEF. Modes checked will include USB voice, LSB voice, ISB voice, AM voice, CW and FSK. Voice checks will consist of a short count. CW will consist of 10-15 seconds of "V" followed by the ship's international call sign and "AR" (out). FSK will consist of ten seconds of FOX test message. A test set should be used for the FSK test; i.e., UGM-8 or UGM-11. This demonstration should be scheduled during the underway portion of the Material Inspection. Current SESEF information is available in the SESEF Combat Systems Test Procedures Manual (NAVSEA 50300-A1-MAN-010).

(d) Demonstrate all receiver sensitivities using PMS standards.

(e) Check transmitter power outputs and VSWR checks using PMS standards. Power output will be determined using a calibrated RF voltmeter for HF transmitters and UHF/VHF transceivers (instead of internal meters).

(f) Measure coupler insertion losses using PMS standards and a calibrated meter.

(g) Conduct operational checks of crypto, secure voice, and terminal equipment with the assist ship or SESEF. Ensure crypto keymat is available to test all crypto systems.

(h) Demonstrate HF-to-UHF communications relay.

(i) Conduct an operational demonstration of message processing equipment and NAVMACS equipment. Diagnostics and PMS checks will also be conducted.

(j) Conduct reliability checks on all antennas through transmission line time domain reflectometry (TDR) checks and antenna meggering.

(k) Demonstrate all functions of the Quality Control Monitoring System.

k. Intelligence, Signals Exploitation and Meteorology.

(1) Outside Assistance. Tactical Intelligence (TACINTEL) Link Control Facility (TLCF) for communications checks of the TACINTEL system.

(2) Functions Verified.

(a) Demonstrate the functional capabilities of the Countermeasures Exploitation System. Perform loop test of all antennas and equipment performance checks.

(b) Demonstrate the functional capabilities of the TACINTEL system. Send and receive test messages with the TLCF and obtain system response rate statistics. Conduct equipment performance checks.

(c) Conduct functional demonstrations of the Cryptologic Combat Support System (CCSS) to include demonstration of the SCI network (SCI ADNS) and data transfer capability with CIC. Perform equipment performance checks.

(d) Intelligence centers perform functional demonstrations of satellite communications, data collection systems, secure television system, tactical mission planning system (TAMPS), photographic processing and interpretation systems, flag data display system (FDDS), GCCS-M and security systems. Conduct equipment performance checks and inspect the tactical flag command center (TFCC) and Sub plot spaces.

(e) Demonstrate weather satellite receive systems, atmospheric analysis systems, communications systems, and weather balloon launching equipment. Inspect weather sensors such as barometers, anemometers, etc. Conduct equipment performance checks.

1. Electronic Warfare.

(1) Outside Assistance. ULM-4 range for active and passive ES systems.

(2) Functions Verified.

(a) Demonstrate ability of active ES systems to function against the SESEF ULM-4 range. (Ships achieving a satisfactory Quick-look Report within 60 days of the inspection will not be required to re-demonstrate active ES systems during the underway phase - advance coordination with INSURV is required.)

(b) Demonstrate ability of the ES system to detect emissions during Air Warfare/Self Defense DTEs.

(c) Verify ES bearing correlation with CDS/radar. Using services or targets of opportunity, the ship will demonstrate the ability to correlate ES information with CDS/radar information to identify contacts.

(d) Verify operation of AN/SSQ-82 Mute and AN/SLA-10 blanking systems, as applicable, including any required radar pre-triggers.

m. Navigation.

(1) Outside Assistance. None required.

(2) Function Verified.

(a) Demonstrate the ability of Autopilot/IBS/VMS (if applicable) to maintain ship's head using minimal rudder and to conduct a course change within operator input limits.

(b) Review the operation and location of each navigation light for full compliance with the navigation rules. Findings of these inspections will be documented. Specific comments will be made on any light not operating or not in compliance with the rules, and whether repair or a waiver is required prior to underway operations. Comments summarizing these results should be included in the report for each ship. At a minimum the inspector will:

i. Verify all navigation lights meet the visibility requirements of the navigation rules.

ii. Verify the location of task light array (i.e. below, above, or between the masthead lights).

iii. Verify the required vertical and horizontal separation between all navigation lights exists.

iv. Verify all navigation lights are in accordance with any previously issued waivers.

v. Determine if "closest possible compliance" has been achieved.

vi. Determine if a waiver due to "special construction or purpose" appears warranted or is already documented and on hand.

(c) Verify operation of bridge night vision devices (AN/PVS-8, etc.).

(d) Verify condition/operation of signal bridge installed (AN/SAT-2, yardarm blinkers, etc.) and portable equipment (multi-purpose lights, etc.), halyards, flag bags, and other navigation equipage.

(e) Verify condition/operation of the bridge window washers, window wipers and window heaters.

n. Mine Warfare.

(1) Outside Assistance. Standard practice shapes for the mine-hunting sonar will be used. If not available, targets of opportunity will be used.

(2) Functions verified.

(a) Conduct MAW operational demonstration. This will consist of using the mine-hunting sonar and mine neutralization system to search for, detect, classify and neutralize a mine-like object IAW reference (o). Mechanical/influence sweep gear will also be demonstrated (if applicable) IAW reference (q).

(b) Demonstrate correlation of range and bearing between search and classification sonars.

(c) Demonstrate accuracy of range and bearing transmissions to displays.

(d) Demonstrate launch/retrieval capability of sonar towed body.

(e) Demonstrate fathometer range accuracy on all scales.

(f) Demonstrate the Battle Space Profiler (BP) and expendable bathythermograph (XBT).

(g) Demonstrate weapons handling equipment and magazine sprinkler/alarm systems.

(h) Demonstrate all MIW winches, cranes, and hoists, including associated hydraulic power units.

(i) Demonstrate all precise navigation systems.

(j) Demonstrate the ability to employ the AN/SLQ-48(V) Mine Neutralization System (MNS).

o. Information Systems.

(1) Outside Assistance. Any available shore or afloat unit participating in a GCCS-M environment, all available CENTRIXS enclaves, and Battle Force Email.

(2) Functions verified.

(a) Demonstrate reliable network functionality (reference (q) pertains) on all classified and unclassified networks, including coalition and special purpose networks (CENTRIXS, BFEM, ICAN, SWAN, etc.) by exchanging data.

(b) Assess the adequacy of the installation of shipboard network systems. The physical hardware shall be examined for proper cable installation, shock-mounting of hardware devices, and physical security. Additionally, software installation/configuration shall be assessed in accordance with the current software configuration baseline for the ship.

(c) Demonstrate the proper functionality of the GCCS-M, including the ability to pass track data to assist ship/shore facility via the FOTC Net utilizing OTCIXS/TADIXS/NETPREC.

(d) Demonstrate the proper functionality of the Advanced Digital Networking System (ADNS), including associated UPS, routers, and Network Encryption System (NES)/TACLANE, and all associated RF communications interfaces.

(e) Demonstrate the following capabilities via pier connection and satellite: e-mail, web browsing and chat (via ADNS).

p. Surface Main Battery Gun Live Fire Demonstration (CRUDES only).

(1) INSURV is initiating a main battery gun firing demo. A separate demo instruction is being drafted, in the interim INSURV will provide demo instructions during ship pre-briefs.

6. Post-underway Phase.

a. This phase will consist of testing which either cannot be or is not accomplished during underway operations.

b. A mast inspection should be scheduled during the inport phase, for 1300 Day 2 (primary) or 0800 Day 3 (alternate). All radars and HF communications must be tagged out for the mast inspection. As practicable, the mast inspection should coincide with Electrical Plant Control Panel/Dead Bus testing. Communication antennas designated by the INSURV inspector will be inspected and tested for insulation resistance (meggered). Tilting antenna platforms designated by the INSURV inspector will be demonstrated. A comprehensive material and safety inspection will be conducted. The condition of all navigation lighting, radar/communications antennas, waveguides, antenna weatherproofing, grounding and topside connectors, antenna cutout switches, RF hazard labeling, cable standoffs, platform nonskid, preservation, climber safety rails, ladders, and life rails/ropes will be inspected.

c. Power verification and combat systems ABT demonstrations will be scheduled by the electrical inspector and the senior C5 inspector, usually coinciding with mast inspections.

d. Ordnance handling and stowage capabilities, to include complete handling paths, will not normally be demonstrated during Material Inspections. Handling demonstrations may require use of dummy shapes, which should be obtained as an item of outside assistance if not normally held onboard. Verify with INSURV prior to the inspection what training/dummy shapes will be required. All ordnance handling equipment (OHE) and material handling equipment (MHE) will be inspected in accordance with NSTM and PMS standards during MIs.

e. Magazine protective systems to include magazine sprinkling systems, VLS Hazards, toxic gas dampers, associated alarms and visual/audio indicators (F, FD, FH, and DL circuits).

f. Tomahawk capable ships conduct a Strike Mission Planning scenario with the aid of an assist ship.

(1) Tomahawk capable ships will demonstrate the ability to establish required communications, process a MDU (including an Automated Mission Data Transmit Order (AMDTO)), and conduct Tomahawk missile engagements.

(2) Demonstrate the ability to update current GPS almanac data from an external source and the operability of both WSN-5/7 interface configurations.

(3) Verify operation of the salvo warning alarm and toxic gas vent dampers/combat systems recirculation dampers (if applicable).

g. An integrated training scenario should be scheduled to evaluate any embedded training system such as BFTT, BEWT, etc. Integrated training scenarios should be scheduled so as not to conflict with other associated equipment material checks.

h. Conduct radar output power, VSWR, and receiver sensitivity/MDS measurements on all radars. Perform all readiness PMS checks on radars.

i. Verify operation of each barrel of each chaff launcher from each firing position (CIC, Bridge, etc.) using a test round (Decoys will not be fired). Check salvo warning alarms, test night loading lights, and check ready-service lockers.

j. Conduct AN/SLQ-32 diagnostics tests, ESM sensitivity, transmission line TDR measurements, noise balance data and PMS/RCM test checks.

k. Conduct a visual inspection of all installed Passive Countermeasures (PCMS) (tiles and blankets) if applicable.

l. Verify operation of the MK 53 NULKA launchers, if installed.

m. Verify condition/operation of installed electronic charting and/or voyage management systems (e.g. NAVSSI, ECDIS).

n. Verify condition/operation of the EM Log/DSVL/DEML.

o. Verify condition/operation of the DRA/DRT/CADRT.

p. Demonstrate compliance with security measures discussed in reference (r) for network operations.

q. Demonstrate compliance with DOD, Fleet and Type Commander network certification and accreditation requirements.

r. Demonstrate capability to maintain networks, including performance of a system data back-up/restoration procedure.

s. Demonstrate the proper functionality of network server and client application software (GOTS-D, NTCSS, etc.) including diagnostics.

t. Perform operational tests/demonstrations of all major installed network hardware components, including uninterrupted power supplies (UPS), file and mail servers, primary and back-up domain controllers, proxy servers, backbone and edge switches, routers, and hub devices.

u. Conduct an inspection of 25 (or at least a 10% sample, which ever is greater) of the installed shipboard workstations and peripheral devices (printers, tape drives, external disk drives, etc.) for proper operation and configuration.

v. Equipment designated by the senior C5I inspector will be opened for inspection.

APPENDIX D

HABITABILITY

1. Habitability Inspections. Spaces will be inspected for general cleanliness and sanitation; adequacy of lighting and heating; ventilation and air conditioning (HVAC); potable water supply; drainage; electrical safety; general safety; missile hazards; overhead, bulkhead and deck preservation and treatment (e.g. carpet, tile, sheathing); adequacy of general stowage; and compliance with the flammable removal program.

2. General Inspection Criteria. All ships are inspected to the design standards of reference (s) (implemented in the Shipboard Habitability Design Criteria Manual), General Specifications for Ships of the U. S. Navy (GENSPECS), Coast Guard and/or American Bureau of Shipping (ABS) standards, as appropriate.

a. The Executive Officer or designated representative should be the primary habitability point of contact. All office and common use spaces should be open and ready for inspection, and at least one knowledgeable escort should be provided for each habitability inspector. On large ships, the CMAA or his representative should accompany the inspecting party. The ship's force representative accompanying each inspector should be prepared to provide to the inspector the deficiencies applicable to each space.

b. INSURV recommends the Executive Officer, Command Master Chief, or designated representative make personal telephone contact with the INSURV Senior Habitability inspector well in advance of the Material Inspection to ensure proper coordination of all aspects of the Habitability inspection.

c. Have information and documentation available for use by the INSURV Habitability inspectors IAW reference (v).

d. Keys to habitability spaces, cleaning gear lockers, linen lockers, baggage storage, offices, etc., should be readily available and presented when requested by the inspector.

e. A lack of DEEP CLEANING is the most detrimental deficiency and can overwhelm an otherwise "high state of material readiness", especially in officer staterooms, CPO berthing, and crew berthing. Field days, especially waxing, painting, and laying deck tile or non-skid should not be conducted during the week of INSURV.

f. Be prepared to show proof of compliance with MIL-STD 1623D (SH) (fire performance requirements) for items such as chairs, carpets, draperies and bulkhead sheathing that might be questionable.

APPENDIX E

DECK

1. Have information and documentation available for use by the INSURV Deck inspectors IAW reference (v).

2. The following will be demonstrated, opened, or rigged for inspection:

a. All installed anchors with a dedicated anchor windlass, will be dropped in 30 to 35 fathoms of water during Material Inspections, in accordance with prescribed test procedures.

b. The ship's ready lifeboat (outboard boat) will be lowered, operated for one hour, and then recovered prior to the ship getting underway.

c. Open and inspect (inflate) the installed inflatable life rafts on day 4 (if required) as designated by the Deck inspector on day 1. Verify total life raft capacity is 110% of accommodations (for CVs 100% plus 12 life rafts).

NOTE: The ship is responsible for making arrangements for removal and transportation of all life rafts to be tested. Life rafts will be tested at a designated Navy life raft repair facility. If inflation cannot be performed in the life raft repair facility then a tarp and protective padding should be used to avoid damage to life rafts.

d. Pre-stage 10% of the onboard CO<sub>2</sub> abandon ship life preservers and inflate as designated by the deck inspector. Other deck life preserver types (MK-1, Inherently Buoyant) will be randomly inspected.

e. Accommodation ladders, boat booms, leadsman platforms, fueling/replenishment stations, small boat davits, portable davits, heavy weather lifelines (if applicable), and towing rigs shall be rigged for inspection. The scheduling of these inspections will be provided in advance of the Material Inspection. Applicable technical drawings for each rig demonstrated should be provided to the inspector on station.

f. Demonstrate operation of cranes, booms, deck winches, capstans, retractable king posts, cargo/vehicle ramps and hatches, retractable bits/chocks as applicable.

g. Demonstrate operation of vehicle ramps, and side port/plenum doors as applicable.

h. Material specifications as outlined in the Wetwell manual and SEA OPS Vol 1-3 for well deck operations.

APPENDIX F

DAMAGE CONTROL

1. The Damage Control Assistant shall ensure the correspondence, documentation, records, and logs are available for review prior to and during INSURV Damage Control inspection portion IAW INSURVINST 5221.1 series.

2. Underway Demonstrations.

a. Demonstrate operation of AFFF station relief valves (prior to operation of AFFF stations), all main and auxiliary machinery space AFFF hose reel stations, and bilge sprinkling. Demonstrate all AFFF systems underway including flight deck and bilge sprinkling systems.

b. Demonstrate all installed sprinkler systems outside of the weapons magazines (i.e. hangar bay, incinerator compartment, plastic waste processor rooms, tire storage, berthing spaces, weapons elevators, and pump rooms).

c. All AFFF hosereels and sprinkling system pushbuttons will be demonstrated.

NOTE: The use of AFFF onboard surface ships to demonstrate effectiveness of bilge sprinkling vapor seal can be determined by placing AFFF Systems in recirc and using firemain saltwater as test medium.

NOTE: As a deliverable, the ship is to provide a maintenance history of the AFFF system since the last INSURV Material Inspection. The ship will be required to provide the most recent AFFF quantab and AFFF concentration analyses for each AFFF tank onboard. If related PMS checks are due and will not go out of periodicity prior to the inspection, checks shall be conducted in conjunction with the inspection. Failure to provide requested data will require a full system test.

NOTE: Ships must ensure that all bilge sprinkling nozzles are visible during demonstration. The removal of deckplates may be necessary to view nozzles. Proper flow and discharge through bilge nozzles will be inspected. If nozzle placement makes an adequate vapor seal suspect, INSURV will require bilge sprinkling demonstration using finished foam AFFF product.

NOTE: If system operations/deliverable/inspection (e.g. cla-valve leakage) indicate non-compliance with standards, INSURV will require a full system demonstration. The decision will be made by the Senior Inspector upon recommendation of the Senior DC inspector.

NOTE: Testing of AFFF bilge sprinkling in machinery spaces of nuclear-powered ships is conducted in accordance with INSURV letter 4790/03/SB376, serial 9C11040, dated 09Nov1990, which utilizes test cast fittings to prevent any discharge of AFFF.

NOTE: Ship's speed shall not exceed 15 knots across the deck during AFFF flight deck or Countermeasure Washdown (CMWD) demonstrations. Appropriate foul weather gear will be made available, including rain suits, goggles and boots. Waterproof diagrams of the CMWD nozzles (including number and location) shall be available.

d. Demonstrate firemain capacity during CMWD. Set condition Zebra on the firemain system to demonstrate the ability to maintain minimum firemain pressure during the CMWD portion.

e. Demonstrate all remote operators which control saltwater sprinklers and firemain isolation valves.

f. Conduct the ballast demonstration. The number of deballast air compressors and hydraulic power units specified in the Ballast Operational Sequencing System must be operational. The stern gate and half of the stern gate hydraulic power units must be operational.

g. Demonstrate main and secondary drainage systems including eductors and remotely operated valves.

3. Underway/Inport inspections as Ship's SOE Timeline Permits.

a. Test a representative number of high temperature, smoke, bilge flooding, and heat detection alarms.

b. Test decontamination station showers.

c. Test portable DC equipment (desmoking fans, rescue equipment, emergency generator, etc.).

d. Test all breathing apparatus systems, including SCBA units or OBA units, installed and portable cylinder charging systems and supplied air respirators. Demonstrate ability to determine air quality.

e. Test freshwater firefighting system and hosereels.

#### 4. Post-Underway Inspections.

a. Test all fixed CO<sub>2</sub>, HALON and Aqueous Potassium Carbonate (APC) system controls, alarms, indicators and cutouts, including HALON and CO<sub>2</sub> system time delays as well as ventilation shutdown and toxic gas damper interlocks.

b. Demonstrate all portable P-100 fire pumps and portable electric submersible pumps as follows:

1. Each P-100 pump will be completely rigged in a position that allows self-priming. This includes:

- a. Suction hoses (2) with foot valve.
- b. JP-5 cans.
- c. Exhaust hoses.
- d. One 50-foot length of 2 1/2-inch hose with nozzle in solid stream position.
- e. One pump will be rigged and tested for deep suction (greater than 20 ft suction lift).

c. Lay out the electrical submersible pumps to facilitate the inspection of tending lines, electrical safety checks of the pumps, and verification of pump rotation. Leave the switch box open for inspection (equipment is not to be energized until directed by inspector).

d. Test all collective protection system (CPS) zones to evaluate zone pressure, alarm set points, ventilation interlocks and air flow.

- e. Test and operate all CBR Detection equipment to include:
- 1) IPDS
  - 2) JPBDS
  - 3) AN/KAS 1A
  - 4) Radiacs
  - 5) DFU/HHAs/BRKs

f. Representative tanks (including ballast tanks, feedwater tanks, potable water tanks) and voids will be opened. The number of tanks to be opened will be determined by ship size. Specific tanks to be opened will be determined by the inspectors and ship's force.

NOTE: These spaces shall be made safe for entry using procedures detailed in NAVSHIPS Technical Manual 090 and 074 Volume 3. Just prior to the inspector's entry, each space shall again be verified to ensure it is still "Safe for Entry" IAW the JFMM (these safety precautions apply for all tanks and voids to be inspected).

5. Miscellaneous Inspections.

a. All damage control repair stations and decontamination stations.

b. A representative number of fire stations.

c. A representative number of portable CO<sub>2</sub>, AFFF, and PKP cylinders.

d. A representative number of accessible compartments, hull and superstructure. Examine structure for marked distortion, buckling or dishing, or evidence of weakness such as cracked welds.

e. Labeling on ventilation and piping systems.

f. Chemical warfare defense storeroom and personnel protective clothing.

g. Flammable storage locker.

h. Rescue and assistance chest/locker.

i. Representative number of watertight closures and firezone doors.

j. Representative number of EEBDs.

k. Drop a firemain valve in the main firemain loop for inspection of firemain piping integrity and fouling. Ship's Force may provide digital photographs of the main firemain loop and the removed valve if accomplished within 90 days of the inspection. Photographs should capture the sealing surface of the valve and cross sectional view of the upstream and downstream piping. Photographs should include a scale or ruler. A copy of the tagout for the removal should also be provided.

APPENDIX G

AVIATION - AIR CAPABLE SHIPS

1. Inspection Criteria. The aviation portion of an INSURV Material Inspection is based on the following references:

- a. General Specifications for Ships of the U. S. Navy (NAVSEA S9AA0-AA-SPN-010).
- b. Applicable technical manuals.
- c. Aviation Facilities Bulletin No. 1 (Series).
- d. NWP-3-04.1 (formerly NWP-42).
- e. Applicable PMS.
- f. Ship Safety Review Guide (NAVSAFECEN 9077CL).
- g. Shipboard Aviation Facilities Resume (NAEC-ENG-7576).
- h. COMNAVSURFORINST 3700.1A.

2. General Demonstration Procedures. The proficiency of personnel in operating equipment will not be assessed, nor will departmental training. However, personnel must be available who can safely demonstrate equipment using posted operating procedures, maintenance requirement cards (MRCs), and technical manuals for installed equipment. INSURV inspectors do not operate equipment. Each installation varies and ship's company may be required to support several simultaneous demonstrations. Aviation demonstrations must be coordinated and integrated into the overall ship schedule to expedite the inspection and avoid conflicts.

3. Areas of Responsibility. The focus of the Aviation inspection is on the material and maintenance condition of equipment, systems, and spaces in the following areas:

- a. An inspection and an inventory of aviation items in the Allowance Equipage List (AEL).
- b. Flight deck safety nets and attaching hardware.
- c. Electrical servicing systems (28 VDC, 400 Hz).

- d. Pneumatic servicing systems.
- e. Recovery assist, securing, and traversing (RAST) system.
- f. JP-5 fuel system and associated piping.
- g. Hangar bay doors.
- h. Flight deck and hangar bay markings, non-skid, lighting, tie-downs and deck drains.
- i. Stabilized Glide Slope Indicator (SGSI) and Horizontal Reference System (HRS).
- j. Helicopter control station.
- k. Helicopter detachment work spaces.

4. Information Required Upon Arrival.

- a. Have information and documentation available for use by the INSURV Aviation inspectors IAW reference (v).

5. Sequence of Events for Air Capable Ships.

a. Flight operations will not normally be conducted and are not required for any facet of the Aviation Material Inspection. Normally Aviation inspectors do not get underway on day one. Aviation inspections will be completed on the second and third day of the inspection. In order to expedite the Aviation inspections, plan the events on a not-to-interfere basis with other departmental inspections. The following sequence of events is a general guide that can be used to avoid conflicts with other departmental inspections. Coordinate with the assigned Aviation inspector prior to the inspection to determine specific areas to be inspected and adjustments to the SOE which will enhance the timely execution of the inspection checklist.

b. Inport Phase.

- (1) Review documentation required by reference (v).
- (2) AEL inventory and inspection.
  - (a) Aircraft crash and salvage equipment.

(b) MK-1 life preservers and personal protective equipment (to include testing of the Man Overboard Identification (MOBI) system, if installed). All life preservers will be visually inspected and a small percentage of them will be chosen at random and inflated.

(c) Aircraft support equipment.

(3) Safety Net System. An inspection of the flight deck safety net system in both the up and down positions will be conducted.

(4) JP-5 Fuel System. The inspection of JP-5 storage tanks will be contingent upon tank refinishing history and previous inspection reports. One of the service tanks shall be inspected by visual examination through the tank top with fuel pumped down to a level where the bottom of the tank can be seen clearly with a flashlight. Storage tanks, which have satisfactory inspection results, reported by a U.S. Navy tank inspector (TYCOM, PERA, ASIR, etc.) within the past 60 days generally will not require inspection. Where JP-5 storage tanks do not meet these requirements, the aviation inspector will normally inspect the tank with the oldest full coating. Normally, physical entry into a JP-5 fuel tank is not required, but if there is a requirement to enter a tank, all safety requirements shall be complied with.

NOTE: These spaces shall be made safe for entry using procedures detailed in NAVSHIPS Technical Manual 090 and 074 Volume 3. Just prior to the inspector's entry, each space shall again be verified to ensure it is still "Safe for Entry" (These safety precautions apply for all tanks to be inspected).

The service and transfer systems will be operated, and fuel samples taken and analyzed. The entire system will be inspected including:

- (a) All topside fittings.
- (b) Vent risers.
- (c) Operating instructions.
- (d) Fueling nozzles (over-wing and under-wing).
- (e) Continuity of fuel hoses.

- (f) HIFR rig.
  - (g) Stripping system.
  - (h) JP-5 service and transfer pump including bypass pressures.
  - (i) Pressure regulator valve.
  - (j) Flow rates of the under-wing nozzle with the hose fully flaked out on the deck.
  - (k) Differential pressures across the filter/separators.
  - (l) JP-5 piping and verify proper color coding, labels, and flow arrows.
  - (m) All overflows and vents will be inspected for flash screens and operable one-way check valves.
  - (n) Defueling pump.
  - (o) Cross-connect ability to pump JP-5 to diesel day tanks and boiler fronts.
  - (p) Tank level indicators and associated alarms.
- (5) RAST System. The RAST system will be operated without aircraft and tested to the fullest extent using the RAST technical manual and PMS. A pull calibration test on the rapid securing device (RSD) will also be accomplished. The RAST track plates may be lifted at the turnaround, tensioning deflector and the takedown sleeves for inspection.
- (6) Hangar Bay.
- (a) Operation of telescoping hangar electrically and manually. (LPD only)
  - (b) Operation in all modes of the hangar doors.
  - (c) Hangar maintenance hoist(s).
  - (d) Pneumatic and electrical servicing (400Hz AC and 28VDC).

(e) Hangar bay ventilation, lighting and darken ship capability.

(f) Blade stowage.

(g) Maintenance spaces.

(7) Control Tower.

(a) Window wipers/washers.

(b) Ready deck status system.

(c) 5 MC and all MC boxes.

(d) Tower internal radio communications to include sound powered phones.

(e) Crash alarms.

(f) Lighting panels and motor driven rheostats.

(g) Wind System. System will be operationally tested and visually inspected.

(8) Flight/Hangar Deck and Lighting. All associated decks will be inspected for sufficient and accurate markings and deck covering. All lighting fixtures will be visually inspected and tested.

(9) The Horizontal Reference System (HRS) will be operationally tested and inspected.

(10) Captain's Ready Deck Lighting System (Flight Deck Status Lights) will be tested at all stations.

(11) Stabilized Glide Slope Indicator (SGSI). The unit will be inspected with boot dropped and the pole check will be conducted.

(12) NAVAIR certified HOSS Camera will be inspected and tested.

(13) Aviation Workshops. A general work space inspection will be conducted. Compliance with all NAVOSH requirements will be checked for all installed equipment.

APPENDIX H

AVIATION - AVIATION SHIPS (CV/CVN) AND  
AMPHIBIOUS ASSAULT SHIPS (LHA/LHD)

1. Inspection Criteria. The aviation portion of INSURV Material Inspections is based on the following references:

- a. General Specifications for Ships of the U. S. Navy (NAVSEA S9AA0-AA-SPN-010).
- b. Applicable technical manuals.
- c. Aviation Facilities Bulletin No. 1 (series).
- d. Amphibious Assault Ship Aviation Facilities Bulletin (No. 2).
- e. NWP-3-04.1.
- f. CV/CVN NATOPS.
- g. LHA/LHD NATOPS.
- h. Applicable PMS.
- i. Ship Safety Review Guide (NAVSAFECEN 9077CL).
- j. Shipboard Aviation Facilities Resume (NAEC-ENG-7576).
- k. COMNAVSURFORINST 3700.1A.

2. General Demonstration Procedures. The proficiency of personnel in operating equipment will not be assessed, nor will departmental training. However, personnel must be available who can safely demonstrate equipment using posted operating procedures, Maintenance Requirement Cards (MRCs), and technical manuals for the installed equipment. INSURV inspectors do not operate equipment. Each installation varies and ship's company personnel may be required to support several simultaneous demonstrations. Aviation demonstrations must be coordinated and integrated into the overall ship schedule to expedite the inspection and avoid conflicts.

3. Areas of Responsibility. The focus of the Aviation inspection is on the material and maintenance condition of equipment, systems, and spaces in the following areas:

a. An inspection and an inventory of aviation items in the Allowance Equipage List (AEL).

b. Flight deck safety nets and attaching hardware.

c. Electrical servicing stations (28VDC, 400Hz, Hydraulic Service Cart Receptacles).

d. Pneumatic and aircraft air-start servicing stations.

e. AV-8 de-mineralized water system (LHAs/LHDs only).

f. JP-5 fuel system and associated piping.

g. Lube oil system for catapults (CVs/CVNs only).

h. Catapults and associated Jet Blast Deflectors (JBD) (CVs/CVNs).

i. Arresting gear and barricade (CVs/CVNs).

j. Crash and salvage equipment.

k. Aircraft elevators, elevator doors, and hangar bay divisional doors.

l. Flight deck and hangar bay markings, non-skid, lighting, and tie-downs.

m. Visual Landing Aids (VLA) to include the Fresnel lens (CVs/CVNs) and Stabilized Glide Slope Indicator (SGSI) (LHAs/LHDs).

n. Flight deck camera systems.

o. Squadron ready-rooms.

p. Primary flight control (PRI-Fly).

q. Airwing/Squadron work spaces.

r. Conflagration (CONFLAG) stations.

s. The Aircraft Intermediate Maintenance Department (AIMD) departmental work spaces and installed equipment.

t. MOGAS and storage if installed.

u. Flight Deck Control.

4. Information Required Upon Arrival.

a. Have information and documentation available for use by the INSURV Aviation inspectors IAW reference (v).

5. Sequence of Events.

a. Flight operations are not normally conducted and are not required for any facet of the Material Inspection. The following is a general guide to expedite the Aviation inspection and avoid conflicts with other departmental inspections. Coordinate with the Aviation inspector prior to the inspection to determine specific areas to be inspected and adjustments to the SOE which will enhance the timely execution of the inspection checklist.

b. Underway Phase.

(1) Review all applicable documents and certifications listed in reference (v).

(2) AEL Inventory and Inspection.

(a) MK-1 life preservers and personal protective equipment (to include testing of the Man Overboard Identification (MOBI) system, if installed). All life preservers will be visually inspected and a small percentage from each division will be chosen at random for inflation.

(3) Safety Net/Rail System and Catwalks. Inspection of the flight deck and catwalks safety net system in the down position.

(a) Condition of catwalk decks, lighting, labeling on all installed equipment, communications connections including sound power phones, electrical connections, and cable runs.

(4) JP-5 Fuel System. The inspection of JP-5 tanks will be contingent upon tank refinishing history and previous inspection reports. Normally, at least one service and one

storage tank will be inspected by visual examination through the tank top with fuel pumped down to a level where the bottom of the tank can be seen with a flashlight. Fuel tanks with satisfactory inspection results reported by a U. S. Navy tank inspector (TYCOM, PERA, ASIR, etc.) within the past 60 days may not be required to be inspected. Where JP-5 fuel tanks do not meet these requirements, the aviation inspector will normally inspect the tank(s) that have the oldest full coating. Normally, physical entry into a JP-5 fuel tank is not required, but if there is a requirement to enter a tank, all safety requirements shall be complied with.

NOTE: These spaces shall be made safe for entry using procedures detailed in NAVSHIPS Technical Manual 090 and 074 Volume 3. Just prior to the inspector's entry, each space shall again be verified to ensure it is still "Safe for Entry." (These safety precautions apply for all tanks to be inspected).

The entire system will be inspected including:

- (a) All topside fittings.
- (b) Vent risers.
- (c) Operating instructions.
- (d) Fueling nozzles (over-wing and under-wing).
- (e) Continuity of fuel hoses.
- (f) Fuel station megamps.
- (g) Stripping system.
- (h) JP-5 service and transfer pumps, including bypass pressures.
- (i) Pressure regulator valve.
- (j) Flow rates of the under-wing nozzle with the hose fully flaked out on the deck.
- (k) Differential pressures across the coalescer/filters.
- (l) Fuel purifiers.

(m) JP-5 piping and verify proper color coding, labels and flow arrows.

(n) All overflows and vents will be inspected for flash screens and operable one-way check valves.

(o) Defueling pump.

(p) Cross-connect ability to pump JP-5 to diesel day tanks and boiler fronts.

(q) Tank level indicators and associated alarms.

(r) Bilge condition, bilge foundations and deck gratings.

(5) Control Tower.

(a) Window wipers/washers.

(b) Ready deck status system.

(c) 5 MC and all MC boxes.

(d) Tower radio communications to include sound powered phones.

(e) Crash alarms.

(f) Lighting panels and motor driven rheostats.

(g) Air Boss deck and equipment status lighting and communication system.

(h) Wind System. Visually inspect and test all displays/repeaters.

(6) Hangar(s).

(a) Proper stowage.

(b) Maintenance hoist(s).

(c) Electrical servicing stations (400Hz AC, 28 VDC and Hydraulic Service Cart Receptacles).

(d) Indoor lighting and darken ship circuitry.

(e) Divisional doors (including operational checks) and associated machinery rooms.

(f) CONFLAG stations (check visibility and alarm systems).

(g) Markings, deck covering, and tie-downs.

(7) Flight Deck Visual Landing Aid (VLA) markings and non-skid deck covering will be inspected.

(8) Flight Deck Lighting.

(a) The rotary beacon(s) and all flight deck lighting systems.

(b) SGSI installation. The system should remain on until completion of the system checks. The SGSI will be checked in gyro stabilized mode and ship's gyro mode, including the wave-off lights. A pole check alignment will be conducted.

(c) Inspect and test the Fresnel lens, associated lights, computer and landing signal officer's (LSO) HUD/Platform, ILARTS, IFLOLS, etc.

(d) Optical landing aids for AV-8 aircraft (HAPI, HPI).

(9) Captain's Ready Deck Lighting System will be tested at all stations.

(10) Manually Operated Visual Landing Aid System (MOVLAS) rigged and functionally checked in both port and starboard locations.

(11) AV-8 de-mineralized water system test.

(12) Aircraft Elevators.

(a) An operational check of all aircraft elevators, in all modes.

(b) Aircraft elevator machinery rooms.

(c) Elevator safety interlocks.

(d) Stanchion rooms and a functional test of the stanchions.

(13) Crash and Salvage.

(a) All portable aircraft fire fighting equipment and an AEL inventory.

(b) An inventory and check of aircraft slings.

(14) AIMD.

(a) Shop-to-shop equipment installation.

(b) Industrial shops.

(c) Squadron maintenance spaces and ready rooms.

(15) The following aviation equipment will be demonstrated/inspected underway:

(15a) Flight Deck Lighting.

(a) The rotary beacon and all flight deck lighting.

(b) SGSI.

(15b) JP-5 Fuel System. The service and transfer system will be operated and fuel samples taken and analyzed. The entire system will be inspected and tested. Normally, the fuel station pump-up checks to the flight deck and hanger(s) will be accomplished underway.

(15c) Catapults. A full static inspection of equipment will be completed prior to any dynamic tests.

(a) A thorough grounds check will be performed prior to operating the catapults.

(b) A test of steam smothering will be performed prior to operating the catapults.

(c) The catapults will be tested with no-load shots or when operationally feasible, with aircraft.

(d) All catapult maintenance and storage spaces, and catapult voids.

(e) All catapult engine rooms and control consoles.

(f) Catapult ICCS on carriers.

(g) JBDS and JBD pump rooms (if not completed prior to underway).

(h) Water brake voids.

(i) The catapult lube oil system.

(15d) Arresting Gear. A full static inspection of equipment will be conducted prior to any dynamic tests.

(a) An operational check by pulling the gear with tow tractors.

(b) Inspect barricade equipment (rigging of the barricade is not required).

(c) Sheave dampers and protective screens.

(d) Socket pouring rooms.

(e) All arresting gear maintenance and storage spaces.

(f) Arresting gear and barricade engine rooms.

(g) Barricade storage room.

c. Open and Inspect Phase. The Aviation inspector will provide the ship (responsible authority) with a comprehensive inspection list after the underway portion of the inspection.

(1) Debrief applicable department heads.

APPENDIX I

SUPPLY

1. General. The INSURV Supply inspector(s) will review the adequacy, material condition, and storage aids of supply storerooms and spaces to ensure they support the ship's assigned missions and tasks. They will also inspect food service and laundry equipment for proper maintenance and operation.

2. Preparation Prior to Inspection.

a. Have information and documentation available for use by the INSURV Supply inspectors IAW reference (v).

b. The ship's Supply Officer, when appropriate, should review all PMS requirements on food service and laundry equipment and be able to discuss shortfalls and inadequate coverage.

c. The Supply Officer should be prepared to discuss adequacy of parts and provisions stowage.

3. Conduct of Demonstrations.

a. The senior Supply inspector will observe the Supply department spaces with respect to cleanliness, preservation, stowage, and material condition.

b. All supply department spaces should be prepared for inspection.

c. All food service equipment will be demonstrated. Deep fat fryers, ovens, and griddles must be preheated to 350 degrees F and available for inspection immediately following the in-brief on day one of the inspection. An electrician may be required to demonstrate the deep fat fryer over-temperature shunt trips, if there is no "test" button provided on the equipment.

d. All laundry equipment will be demonstrated.

APPENDIX J

MEDICAL AND DENTAL

1. Definition. The medical inspection includes medical and dental material condition, water purification, and medical waste management.
2. Inspection Criteria.
  - a. Check medical/dental equipment and spaces are in adequate material condition to provide care to the crew and others that may be embarked in the ship.
  - b. Check water purification systems' (chlorine/bromine) adequacy to supply the level of halogen required by NAVMED P-5010-6 and NSTM 533.
  - c. Check sanitation of potable water hoses, hose lockers, and distribution system.
  - d. Review medical/dental personnel medical waste management training.
  - e. Check installation workmanship and accessibility.
  - f. Check for items that may present a clear and immediate danger to personnel or equipment.
3. Preparation.
  - a. Have information and documentation available for use by the INSURV Medical/Dental inspectors IAW reference (v).
  - b. Be prepared to demonstrate all functions and capabilities of installed equipment.
  - c. Be prepared to operate all emergency potable water tanks, and open tanks for inspection if required by the inspector.

APPENDIX K

ENVIRONMENTAL PROTECTION

1. Definition. The INSURV environmental protection inspector(s) are responsible for inspecting compliance with the Navy's environmental protection program. This includes not only equipment, but training and procedures that preclude contamination of air and navigable waters due to oil, sewage, or gray water drains, ozone depleting substances, solid waste, incineration, and noise pollution.

2. Inspection Criteria.

a. Check the operation and arrangement of all pollution control equipment to ensure full compliance with the requirements of reference (t), and to ensure installed equipment can operate to designed capability and may be adequately maintained by assigned crews.

b. Check installation workmanship and accessibility.

c. Check for items that may present a clear and immediate danger to personnel or equipment.

d. Check performance of all pollution control equipment using PMS, NSTMs, system drawings, and operating procedures.

e. Inventory the oil and CHT spill response and clean-up kits.

f. Review documentation of sewage system, solid waste processing, and oil pollution abatement (OPA) equipment certifications.

g. Review the ship's training and procedures that support the environmental protection program. This includes oil and hazardous substance spill response plans, procedures, training, and qualifications.

3. Preparation.

a. Have information and documentation available for use by the INSURV Environmental Protection inspectors IAW reference (v).

b. Prepare to demonstrate all functions and capabilities of installed equipment's automatic operation, level sensors, alarms, and valve operation (local and remote).

c. Ensure all protective clothing and required sanitation gear is available for inspection and use.

d. Ensure sewage system is leak-free throughout. If a particular leak cannot be corrected, ensure adequate sanitation practices are enforced.

e. Prepare to demonstrate the solid waste processing equipment, including plastic waste processors, shredders, pulpers, and incinerators.

f. Ensure oil spill and CHT response and containment kits are complete with all AEL items.

g. Ensure the sewage system plant operating guide accurately corresponds to the actual installation.

h. Prepare to demonstrate any Pollution Prevention (P2) equipment, such as paint dispensers, parts washers, or similar equipment.

APPENDIX L

OCCUPATIONAL SAFETY AND HEALTH

1. General. The INSURV occupational safety and health inspector(s) are responsible for inspecting compliance with the Navy Occupational Safety and Health (NAVOSH) program. This includes equipment, training and procedures required for implementation and management of the Navy Occupational Safety and Health (NAVOSH) program.

2. Inspection.

a. The NAVOSH oversight inspection will include, but may not be limited to:

(1) A walkthrough of all spaces focusing on occupational safety and health conditions.

(2) Inspection of hazardous noise data and heat stress surveys of appropriate spaces.

(3) Inventory of Hazardous Material spill kits.

(4) Review of Gas Free Engineering and inventory of Gas Free Engineering equipment and detector tubes.

(5) Review Tag Out Log(s).

(6) Examine the occupational health medical surveillance program within the command.

(7) Review of all NAVOSH programs and training.

3. Preparation. The ship should have a working knowledge of reference (e).

a. Have information and documentation available for use by the INSURV Occupational Health inspectors IAW reference (v).

APPENDIX M

VENTILATION

1. Definition. The ventilation inspection includes material condition of fan rooms and air flow alarms; design air flow will also be measured in sanitary spaces (heads, showers, and water closets) and occupational health spaces (Hazmat storerooms/issue rooms, battery charging areas, oil labs, pump rooms (JP-5, CHT, MOGAS), workshops, etc.).

2. Inspection Criteria.

a. Check fan rooms are in good material condition and are not used for unauthorized storage.

b. Inspect air flow alarms for proper operation and correct alarm set point.

c. Check for proper exhaust ventilation rates in sanitary spaces.

d. Check for proper exhaust ventilation rates in occupational health spaces.

3. Preparation.

a. The ship should provide the following items to the ventilation inspector(s) prior to arrival:

(1) A space listing that identifies the location of all fan rooms.

(2) A space listing (such as an EGL) that identifies the location of all installed air flow alarms and their associated sensors.

(3) A space listing that identifies the location of all occupational health spaces (HM storerooms/issue rooms, battery charging areas, oil lab, JP-5 pump rooms, CHT pump rooms, welding shops, etc.).

(4) A space listing that identifies the location of all heads, showers, and water closets.

b. The Ship is to provide a knowledgeable IC person to demonstrate the air flow alarms.

APPENDIX N

CORROSION/STRUCTURAL

1. The two principle corrosion control processes are preservation coatings (e.g. paint) and protective systems (e.g. cathodic protection, grounding strap applications throughout the ship).
2. Corrosion inspections will focus on, but will not be limited to, the status of preservation, structural wastage, cathodic protection, and vapor corrosion inhibitors.
3. The following areas will be assessed by INSURV during the Corrosion inspection:
  - a. Top side exterior areas: bulkheads, cable ways, topside machinery/equipment and foundations, antenna systems and foundations, fanrooms, uptakes, exterior doors, and non-skid.
  - b. Interior: fan rooms, bilges, machinery/equipment and foundations, AFFF stations, aft steering, magazines, berthing and sanitary spaces, food service spaces, cross flooding ducts, chain locker, tanks, and voids.
4. Preservation conditions will be defined according to the American Society for Testing and Materials (ASTM) D610 standard test methods for evaluating the degree of rust on painted steel surfaces.
5. Thirty to Sixty days prior to the MI the following correspondence is to be forwarded to INSURV via Email:
  - a. MI corrosion control POC and CSMP, per MIP 6300 series maintenance index page, for preservatives and coverings.
  - b. History of hull surface painting, per NSTM 631 preservation of ships in service Vol II.
  - c. Long/short term painting and preservation plan (paint schedule), per NSTM 631 preservation of ships in service Vol I and II.
  - d. Previous two years cathodic protection logs, per JFFM Vol VI chapter XVII.

e. All dive reports since last dry docking.

f. List of all VCI emitter locations onboard ship IAW PMS contained in MIP 6300 series.

6. Structural inspection.

a. Provide all Hull inspection reports required by class advisory (e.g. DDG rudder/bow structure CLADS) or TYCOM/NAVSEA direction (e.g. thin hull surveys on FFG's and Structural surveys on CG's). Include PMS results (e.g. aluminum superstructure cracking inspections on CG's).

b. All DFS's that pertain to hull/deck/bulkhead/ducting/piping repairs.

c. Status of tank inspections.